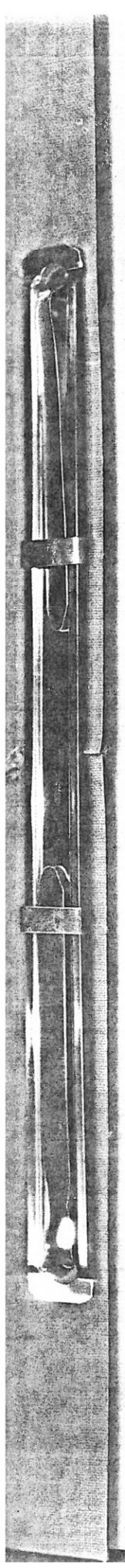

Handbook

Maintenance Instructions

NAVY MODEL

AU-1

AIRCRAFT

THIS PUBLICATION SUPERSEDES AN 01-45HGA-4 DATED 1 FEBRUARY 1952
REVISED 1 SEPTEMBER 1952

This publication shall not be carried in aircraft on combat missions or when there is a reasonable chance of its falling into the hands of an unfriendly nation, unless specifically authorized by the Operational Commander.

PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE AND THE CHIEF OF THE BUREAU OF AERONAUTICS

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SECTION I
GENERAL INFORMATION

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1–1. GENERAL DESCRIPTION.

1–2. The AU-1 airplane, an attack version of the F4U Corsair series, is identified by its inverted-gull-shaped wing. It is a single-seat single-engine attack fighter designed and built by Chance Vought Aircraft Division, United Aircraft Corporation, Dallas, Texas, and it is used for land- and carrier-based low-level fighting and attack bombing. The airplane incorporates a Pratt & Whitney R-2800-83WA Double Wasp C Series engine with Chance Vought-installed accessories, four M-3 (T-31) 20-mm guns, thirteen rocket and bomb racks, armor plate, uhf communication, navigation and identification radio equipment, standard engine, flight, and navigation instruments, flight and nonflight cockpit lighting, retractable landing gear and tail wheel, surface control trim tabs, and a single-bottle oxygen system, and it includes provisions for catapulting, for wing-folding, for two external droppable fuel tanks, for vhf communication radio equipment, and for a two-bottle oxygen system.

1–3. The airplane provides for normal and emergency operation of the canopy, landing gear, wing flap, and hydraulic subsystems, the fuel system, and the oil system. A water injection system and a supercharger are installed to provide additional power during combat. Controlled air flow for engine cooling, carburetor induction, and oil cooling permit cold weather operation. The instruments and pilot-operated controls are grouped to facilitate flight operations. An adjustable seat and adjustable rudder pedals are installed for the pilot's comfort. Access doors and inspection provisions are located to facilitate servicing, maintenance, and removal of units.

1–4. AIRPLANE DIMENSIONS.

1–5. GENERAL.

a.	Span	40 ft 11.762 in.
b.	Length (over-all)	34 ft 6.15 in.
c.	Length (over-all on ground)	34 ft 0.72 in.
d.	Height (tail wheel on ground, propeller blades 45 degrees)	13 ft 0.2 in.
e.	Height (tail wheel on ground, propeller blade vertical at top)	14 ft 9.85 in.
f.	Propeller ground clearance (fuselage reference line level)	4.82 in.
	(three-point attitude)	1 ft 9.63 in.
g.	Wings folded	
	(1) Width (maximum)	17 ft 0.5 in.
	(2) Height (three-point attitude, maximum during folding operation)	18 ft 0.72 in.
	(3) Height (three-point attitude, outer panels completely folded)	16 ft 3.64 in.
h.	Design gross weight (normal fighter)	12,898.6 lb
i.	Maximum alternate gross weight	16,254 lb

1–6. WINGS.

a. Type	Low
b. Airfoil section	
(1) At root of center section	NACA23018
(2) At wing-fold line	NACA23015
(3) At wing tip	NACA23009
c. Chord at root	8 ft 9 in.
d. Theoretical chord at construction tip section (20 ft 5.86 in. from fuselage centerline)	5 ft 11.377 in.
e. Incidence (parallel to fuselage horizontal reference line)	2 degrees
f. Dihedral (measured from leading edge of chord plane)	8 degrees 30 min
g. Sweep-back	
(1) Center section	0 degrees
(2) Outer panel	3 deg, 37 min, 37 sec
h. Aspect ratio (wing cellule)	5.35

1–7. STABILIZER.

a. Span	16 ft 6 in.
b. Maximum chord (measured from centerline of hinge)	33.84 in.
c. Incidence	1.25 degrees
d. Dihedral	0 degrees

1–8. FUSELAGE.

a. Width (maximum)	4 ft 5.23 in.
b. Height (maximum with canopy open at three-point attitude)	9 ft 3.50 in.
c. Length (without engine mount)	24 ft 1 in.
d. Length (with engine mount)	29 ft 1.5 in.

1–9. AREAS.

a. Wings (less ailerons and 37.7 sq ft fuselage area)	258.2 sq ft
b. Wings	314 sq ft
c. Ailerons (total aft of hinge)	18.1 sq ft
d. Flaps (total aft of hinge line normal to reference plane)	36.4 sq ft
e. Stabilizers (including elevators — total horizontal tail surface)	57.9 sq ft
f. Elevators (two, including tabs)	21.9 sq ft
g. Elevator tabs (total)	1.36 sq ft
h. Fin (including 0.86 sq ft area aft of rudder hinge centerline and 1.66 sq ft of contained rudder balance area)	9 sq ft
i. Rudder (including tabs)	13.0 sq ft
j. Rudder trim tab	0.86 sq ft

1–10. ACCESS AND INSPECTION PROVISIONS.

1–11. The access and inspection provisions shown on figure 1–3 (sheets 1, 2, and 3) consist of doors, removable panels, plates, and fairings. These provisions permit access to all parts of the airplane requiring frequent inspection or service.

1–12. GROUND HANDLING.

1–13. HOISTING — AIRPLANE. *(See figure 1–4.)*

a. Open engine mount hoist fitting access door on each side of airplane.

b. Break safety wire securing hoist fittings at aft ends of engine mount.

c. Attach hoist sling to hoisting mechanism and position hoist sling over airplane.

d. Attach hoist sling to hoist fitting on each side of airplane and attach guide ropes to airplane to control swinging. Attaching bolts are chained to hoist sling.

e. Hoist airplane.

1–14. HOISTING — TAIL. *(See figure 1–5.)*

a. Remove lift tube covers and insert lift bar in tube.

b. Attach sling to hoisting mechanism and to lift bar on both sides of fuselage. Hang 600-pound weight on tail wheel or on lift bar (300 pounds on each side of fuselage).

c. Hoist tail of airplane. Do not hoist tail beyond point of level attitude.

1–15. HOISTING — WING OUTER PANEL. *(See figure 1–6.)*

Note

For outer panel removal and installation information, refer to paragraphs 2–470 and 2–471.

a. Attach outer panel handling lift assembly (hoist ring) to jury strut (socket) fitting in main beam walkway area of wing outer panel.

b. Attach hoisting mechanism to lift assembly and hoist wing. Use push points when handling wing.

1–16. HOISTING — QUICK-ENGINE-CHANGE UNIT. *(See figure 1–7.)*

Note

For quick-engine-change unit removal and installation information, refer to paragraphs 5–5 and 5–6.

a. Attach power plant lifting sling to hoisting mechanism and position sling over quick-engine-change unit.

b. Attach front hooks of sling to two eyebolts located on upper portion of engine front crankcase.

c. Attach rear link of sling to fitting on top of engine mount ring. (To hoist engine only, attach sling front and rear hooks to eyebolts in engine front and rear crankcase sections.)

d. Hoist quick-engine-change unit.

1–17. HOISTING — PROPELLER. *(See figure 1–8.)*

Note

For propeller removal and installation information, refer to paragraphs 5–655 and 5–659.

a. Attach sling to hoisting mechanism and position sling over propeller.

b. Attach sling and hoist propeller.

Figure 1–1. Model AU-1 Airplane

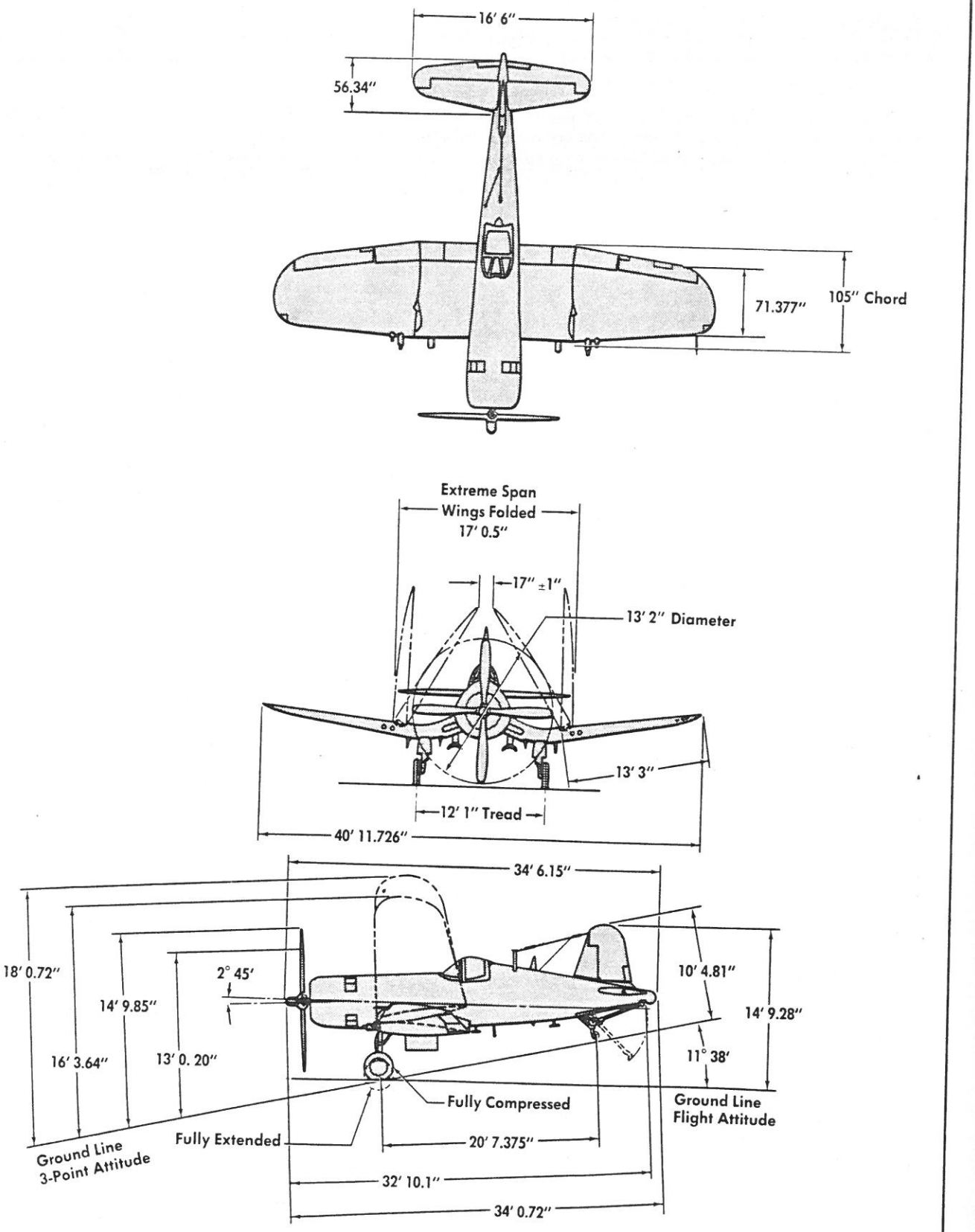
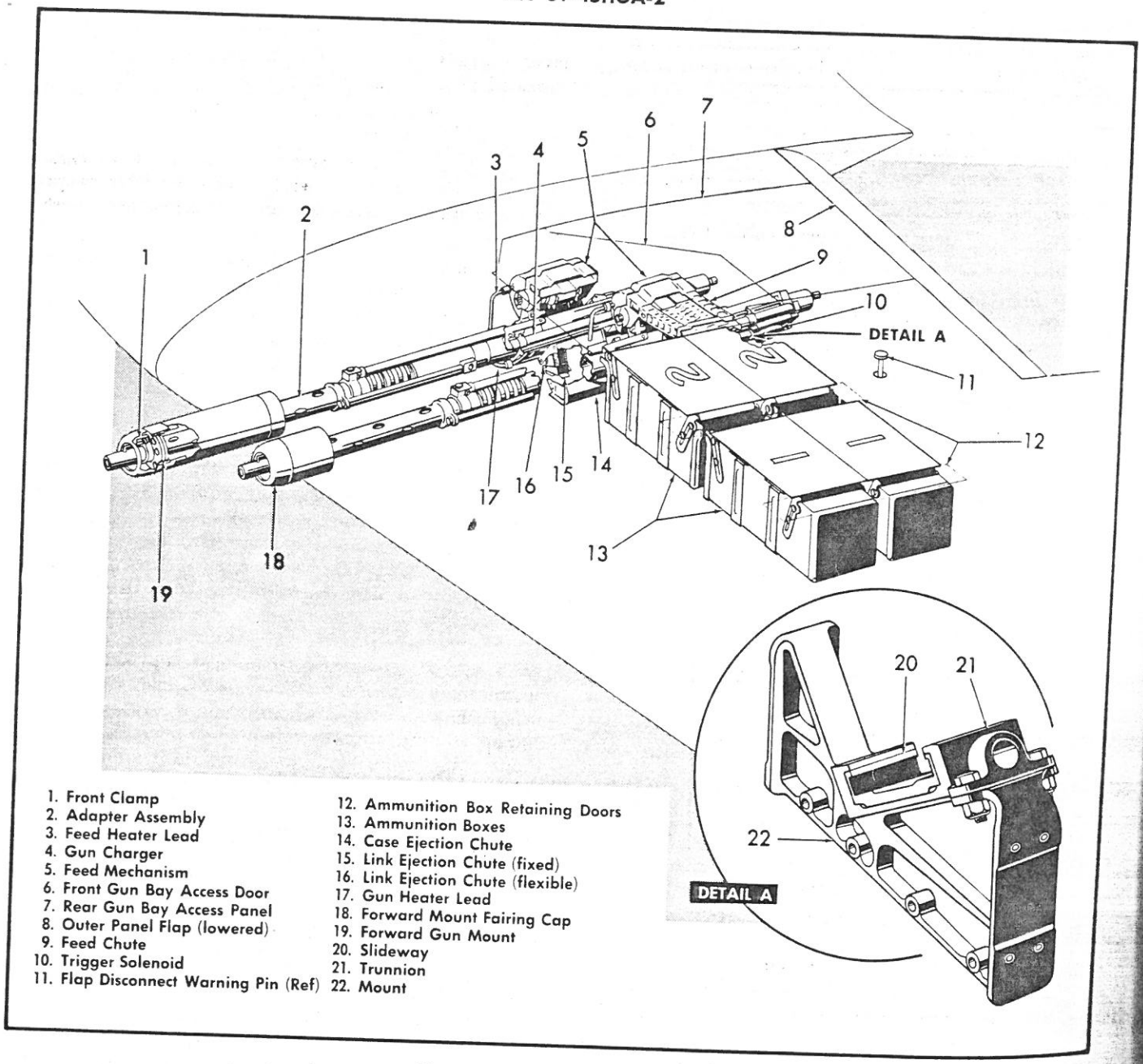


Figure 1–2. General Arrangements



1. Front Clamp
2. Adapter Assembly
3. Feed Heater Lead
4. Gun Charger
5. Feed Mechanism
6. Front Gun Bay Access Door
7. Rear Gun Bay Access Panel
8. Outer Panel Flap (lowered)
9. Feed Chute
10. Trigger Solenoid
11. Flap Disconnect Warning Pin (Ref)
12. Ammunition Box Retaining Doors
13. Ammunition Boxes
14. Case Ejection Chute
15. Link Ejection Chute (fixed)
16. Link Ejection Chute (flexible)
17. Gun Heater Lead
18. Forward Mount Fairing Cap
19. Forward Gun Mount
20. Slideway
21. Trunnion
22. Mount

Figure 9–7. Gun Installation

j. Repeat steps c through i for each of remaining guns.

k. Clean and lubricate all guns (paragraph 9–103).

l. Replace feed mechanisms (paragraph 9–136).

m. Connect external power supply and operate gun firing circuit (paragraph 9–108). Breechblocks should move to forward position.

n. Place all armament switches in "OFF" or "SAFE" positions.

9–106. GUN FIRING.

9–107. GENERAL. The gun firing circuit permits the simultaneous firing of all guns, or the independent firing of either inboard or outboard guns.

9–108. OPERATION. To operate the firing circuit, place the arresting hook control handle in the "UP" position, master armament switch breaker in "ON" position, ready-safe switch in "READY" position, outboard and/or inboard gun selector switches in "ON" position, and depress trigger switch.

Note

Only qualified personnel shall fire guns. Local ordnance regulations shall prevail.

9–109. 20-MM AUTOMATIC GUNS.

9–110. DESCRIPTION *(See figure 9–7.)* Two air cooled 20-mm automatic guns are located in each wing outer panel. Each gun is operated on a gas and blowback principle and has a rate of fire of approximately 720 rpm

3¼, forward of the terminal panel. These relays prevent the trigger solenoid from being prematurely energized.

9–123. REMOVAL.

a. Place power control switch in "OFF" position.

b. Open gun bay doors.

c. Disconnect electrical leads from relay.

d. Remove relay by removing screws attaching relay to rib.

9–124. INSTALLATION. To install the gun firing sequence relay, reverse the removal procedure.

9–125. TRIGGER SOLENOID.

9–126. DESCRIPTION. *(See figure 9–5.)* A trigger solenoid is mounted on the lower aft end of each gun. The trigger solenoid, when energized, draws down the gun sear, allowing the breechblock to go forward.

9–127. REMOVAL.

a. Place power control switch in "OFF" position.

b. Lower outer panel flap.

c. Open front gun bay door (paragraph 2–501).

d. Remove rear gun bay panel (paragraph 2–507).

e. Break safety wire and remove electrical connection at trigger solenoid.

f. Break safety wire and unscrew large nut forward of solenoid housing.

g. Remove trigger solenoid.

9–128. INSTALLATION. To install the trigger solenoid, reverse the removal procedure.

9–129. GUN HEATER THERMOSWITCH.

9–130. DESCRIPTION. *(See figure 9–5.)* A gun heater thermoswitch is fastened to the inboard face of the inboard rib of the wing outer panel. The gun heater thermoswitch energizes the gun heater relay at 4.4°C (40°F) and opens the gun heater circuit at 10°C (50°F).

9–131. REMOVAL.

a. Place power control switch in "OFF" position.

b. Open gun bay doors.

c. Disconnect electrical leads.

d. Remove thermal switch by removing screws attaching switch to rib.

9–132. INSTALLATION. To install the gun heater thermoswitch, reverse the removal procedure.

9–133. GUN HEATER RELAY.

9–134. The gun heater relay is located in the main junction box. The relay is controlled by the gun heater thermoswitch and energizes the gun and feed mechanism heater circuit. For information on the main junction box, refer to paragraghs 7–130 through 7–133.

9–135. FEED MECHANISM.

9–136. DESCRIPTION. *(See figure 9–7.)* A feed mechanism is fastened to the top of each gun. The feed mechanism is a spring-driven recoil-wound device for stripping the links from the ammunition rounds and feeding the rounds into the gun. Left- and right-hand feed mechanisms are not interchangeable.

9–137. REMOVAL.

a. Test gunnery system as directed in paragraphs 9–99 and 9–100.

b. Place power control switch in "OFF" position.

c. Detach link ejection chutes from feed mechanism by depressing bayonet latches.

d. Detach end of feed chutes from feed mechanism by depressing bayonet latches.

e. Disconnect electrical heater harness from feed mechanism.

f. Lift operating lever out from operating lever bracket on side of gun.

g. Raise magazine slide lever and lift rear of feed mechanism.

h. Remove feed mechanism by pulling aft.

Note

Do not dip complete feed mechanism in cleaning fluid or lubricating oil. Starwheel is lubricated during manufacture and no provision is made for cleaning and relubrication.

9–138. INSTALLATION. To install the feed mechanism, reverse the removal procedure.

9–139. AMMUNITION BOXES.

9–140. DESCRIPTION. *(See figure 9–7.)* Four ammunition boxes are fitted into the upper surface of the wing, outboard of the guns. The two inboard boxes carry 110 rounds each, and the two outboard boxes carry 105 rounds each. Each gun is supplied by an outboard and an inboard box whose belts are linked together. Left-hand wing boxes are painted red and numbered 1 (outboard) and 2 (inboard). Right-hand wing boxes are painted green and numbered 3 (outboard) and 4 (inboard). Inboard boxes are black banded.

9–141. REMOVAL.

a. Open ammunition box retaining doors (paragraph 2–509).

b. Open gun bay doors.

c. If boxes are loaded, disconnect belt between boxes and between inboard box and feeding mechanism by removing round from belt.

d. Grasp handles on each end of box and pull out, then up.

e. Remove box by pulling out of wing.

f. Open box by squeezing cover latches together and raising lid.

9–142. INSTALLATION. To install the ammunition boxes, reverse the removal procedure.

9–143. GUN TRUNNION.

9–144. DESCRIPTION. *(See figure 9–5.)* The trunnion is mounted on the rear gun mount and engages the gun slideway. The trunnion provides a rear support and pivot point for the gun.

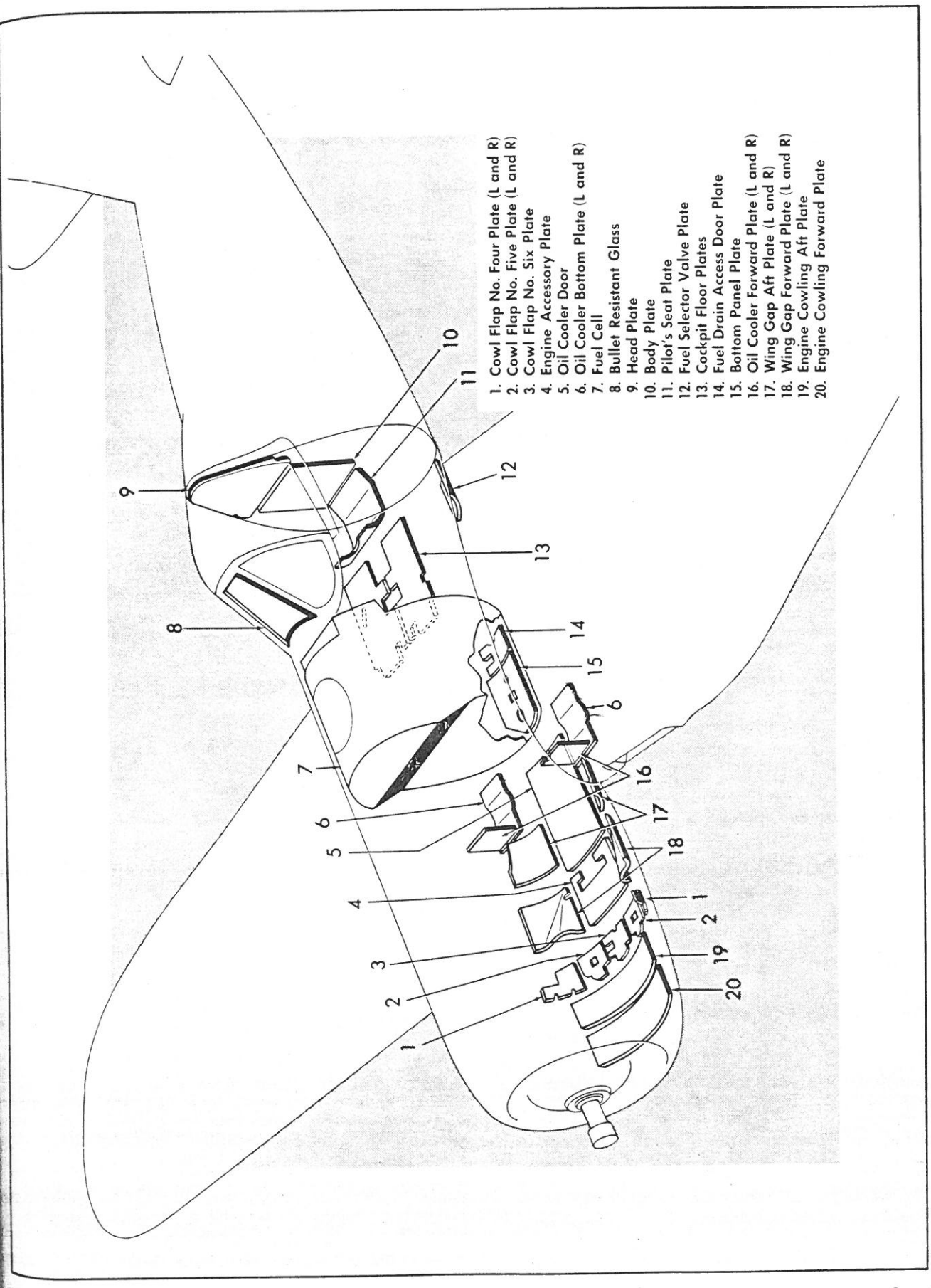

1. Cowl Flap No. Four Plate (L and R)
2. Cowl Flap No. Five Plate (L and R)
3. Cowl Flap No. Six Plate
4. Engine Accessory Plate
5. Oil Cooler Door
6. Oil Cooler Bottom Plate (L and R)
7. Fuel Cell
8. Bullet Resistant Glass
9. Head Plate
10. Body Plate
11. Pilot's Seat Plate
12. Fuel Selector Valve Plate
13. Cockpit Floor Plates
14. Fuel Drain Access Door Plate
15. Bottom Panel Plate
16. Oil Cooler Forward Plate (L and R)
17. Wing Gap Aft Plate (L and R)
18. Wing Gap Forward Plate (L and R)
19. Engine Cowling Aft Plate
20. Engine Cowling Forward Plate

Figure 9–17. Armor Plate

Table XXVII. Engine Specifications

GENERAL INFORMATION	
Type	Two-row, radial, air-cooled
Number of cylinders	18
Bore	5.75 in.
Stroke	6.00 in.
Piston displacement	2,804 cubic in.
Compression ratio	6.75:1.0
Impeller gear ratio:	
Low	7.29:1.0
High	9.45:1.0
Impeller diameter	11.5 in.
Propeller reduction gear ratio	0.450:1.0
Propeller shaft spline size	SAE No. 60A
Maximum weight of engine	2,384 lb
Maximum diameter of engine	52.80 in.
Maximum length of engine	78.20 in.
Approximate center of gravity:	
Forward of rear face of rear crankcase section	11.90 in.
Above crankshaft centerline	0.20 in.
Inlet valve opens	36 degrees before top center
Inlet valve closes	60 degrees after bottom center
Exhaust valve opens	70 degrees before bottom center
Exhaust valve closes	26 degrees after top center
Valves remain open	276 degrees
Valve timing check clearances:	
Front inlet	0.102 in.
Front exhaust	0.127 in.
Rear inlet	0.125 in.
Rear exhaust	0.143 in.
Cold valve adjusting clearance	0.060 in.

ACCESSORY DRIVES	
Fuel pump:	
Type of drive	11 internal involute splines
Ratio of speed to crankshaft	0.864:1.0
Rotation	Counterclockwise
Oil pump drive shaft rotation	Clockwise
Starter:	
Type of drive	12-tooth jaw
Ratio of speed to crankshaft	1:1
Rotation	Clockwise
Generator:	
Type of drive	16 internal involute splines
Ratio of speed to crankshaft	3.033:1.0
Rotation	Clockwise
Propeller governor:	
Type of drive	12 internal involute splines
Ratio of speed to crankshaft	0.964:1.0
Rotation	Counterclockwise
Tachometer:	
Type of drive	1/4-in. square
Ratio of speed to crankshaft	0.5:1.0
Rotation	Clockwise
Hydraulic pump:	
Type of drive	12 internal involute splines
Ratio of speed to crankshaft	1.4:1.0
Rotation	Clockwise
Vacuum pump:	
Type of drive	12 internal involute splines
Ratio of speed to crankshaft	1.4:1.0
Rotation	Clockwise

5–17. THERMOCOUPLE.

5–18. DESCRIPTION. In airplanes Bu Ser No. 129339, 129341 and subsequent, the thermocouple is inserted in a thermocouple well in the rear of the engine No. 4 cylinder head. In airplanes 129318 through 129338 and 129340, the thermocouple is inserted in No. 18 cylinder head. The thermocouple electrically transmits engine cylinder head temperature to a cockpit indicator.

5–19. REMOVAL.

a. Remove upper engine cowling (paragraph 2–54).

b. Disconnect thermocouple from well in cylinder head by releasing bayonet lock.

c. Release clips securing thermocouple leads to structure.

d. Disconnect thermocouple leads and replace nuts on connector terminals.

e. Carefully lift thermocouple out of well.

5–20. INSTALLATION. To install the thermocouple, reverse the removal procedure.

CAUTION

Do not change the lengths of the thermocouple leads as doing so will upset the indicator calibration.

8–1. ELECTRONIC SYSTEMS.

8–2. The major components of the electronic systems are located in the radio compartment with the controls located in the cockpit on the right-hand control shelf (figure 8–1). The following electronic equipment is used in the airplane:

Nomenclature	*Use*	*Control Designation*	*Frequency (mc)*
AN/ARC-27 or AN/ARC-1	Communication	UHF VHF	225–399.9 100–156
AN/ARC-5	Navigation—range	RECVR	0.19–0.55
AN/ARR-2A	Navigation—homing	NAVIG	234–258
AN/APN-1	Radio altimeter	RADIO ALTIMETER ALTITUDE LIMIT SWITCH	
AN/APX-6	Identification radar	IFF	950–1150

WARNING

Handle the electronic equipment used in this airplane carefully to avoid injury from high voltages.

The APX-6 identification radar equipment contains a destruct element which is easily tripped and is dangerous to personnel. When working in the radio compartment, always remove the destruct plug from the RT-82/APX-6 receiver-transmitter and place it in the DESTRUCT plug holder.

8–3. AN/ARC-27 UHF COMMUNICATION SYSTEM.

8–4. GENERAL. *(See figure 8–2.)* The AN/ARC-27 system provides two-way uhf voice communication with ground and other uhf radio stations. This system

AN/ARC-27 UHF Radio System Components

Nomenclature	*AN No. or Mfr. No.*	*Vendor**
UHF radio set control	C-628/ARC-27	GFE
Blank panel	CVC520-15	CVA
Pilot's radio card	VS-70505-4	CVA
Master radio set control	C-626/ARC-27	GFE
Mounting plate	MT-821/ARC-27	GFE
Extension cord set (Stock No. R16 AN-CX-1301)	CX-1301/AR	GFE
Junction box mounting plate	VS-61034	CVA
Jack box clip	VS-70623	CVA
Receiver-transmitter	RT-178/ARC-27	GFE
Mounting base	MT-822/ARC-27	GFE
Antenna	AT-141A/ARC	GFE

*CVA — Chance Vought Aircraft, Dallas, Texas
*GFE — Government-furnished equipment

can be operated from the cockpit or from the radio compartment. An interrupt feedback control relay (paragraphs 8–187 through 8–190) switches the IFF system to mode 2 while the uhf receiver-transmitter is transmitting.

8–5. ADJUSTMENT. The master radio set controller contains provisions for setting 18 desired frequencies and a guard-channel frequency. To preset these frequencies, proceed as follows:

a. Open radio compartment access door. Remove DESTRUCT plug from RT-82/APX-6 receiver-transmitter.

b. Turn LOCAL-REMOTE switch to "LOCAL" position.

c. Set on-off switch to "ON" position.

d. Set GUARD-BOTH-COMD T/R switch to "COMD T/R" position.

e. Set local channel selector switch to position "1."

f. Loosen three wing nuts on frequency selector knobs by counterclockwise rotation until knobs turn freely.

g. Rotate knobs individually until numerals in windows indicate desired frequency for position "1."

h. Tighten three wing nuts while holding knobs so that they do not turn with nuts.

i. Turn local channel selector switch to some other channel, then turn back to channel which has just been set (in this instance channel 1) and check indicated frequency.

j. Repeat steps e, f, g, h, and i for each of the 18 channels to be preset.

k. Set the GUARD-BOTH-COMD T/R switch in "GUARD" position.

l. Following the procedures given in steps e through h, set dials to guard channel frequency.

m. Rotate GUARD-BOTH-COMD T/R switch to "BOTH" position and then switch back to "GUARD" position. Dials should indicate GUARD channel frequency.

n. Check operation of radio set on each channel (paragraph 8–6).

o. Record channel frequencies on pilot's radio card which is located on right-hand control shelf.

8–6. TESTING. To test the AN/ARC-27 uhf radio system, check operation on each channel as follows:

a. With power control switch in "OFF" position, connect source of external electrical power.

b. Open radio compartment access door (paragraph 2–389).

c. Remove DESTRUCT plug from RT-82/APX-6 receiver-transmitter.

d. Plug headset into PHONE jacks on front panel of receiver-transmitter.

e. Place LOCAL-REMOTE switch on radio set controller in "LOCAL" position.

f. Place TONE-VOICE switch in "VOICE" position.